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ACCESSION TO THE MAP-ROOM SINCE THE LAST MEETING OF FEBRUARY 28TH.—A Chart showing the Track of the Swedish Expedition in 1868 under Nordenskiöld and Von Otter. Presented by Dr. A. Petermann.

The PRESIDENT, in opening the proceedings of the evening, stated that he had that morning received a letter from Dr. Kirk, announcing the unwelcome tidings that cholera had broken out with great severity in and near Zanzibar, and that it had spread to a certain extent into the interior of the mainland. Lord Clarendon had communicated to him (the President) the same intelligence. The object in introducing the subject was to allay any alarm with regard to the safety of Dr. Livingstone, as he was far removed from the zone in which the cholera was raging; but the supplies which had been purchased in Zanzibar, and forwarded to him, would of course be delayed for a time, as the porters conveying them had been attacked by the epidemic.

The following Papers were then read :—

- 1.—*On Morrell's Antarctic Voyage in the year 1823, with Remarks on the Advantages Steam will confer on future Antarctic Explorers.* By Captain R. V. HAMILTON, R.N.

THE pre-eminence Britain has maintained in Antarctic discovery we owe to Cook, Ross, Weddel, Biscoe, of the Royal Navy, and to Kemp and Balleny of the mercantile navy. Nor must we forget those public-spirited merchants, Messrs. Enderby, who, to their pecuniary loss, instructed their captains to consider discovery their first object, profit their second consideration, to which we owe the discovery of Kemp, Enderby, Sabrina, and Graham's Land, and the

Balleny Islands. The voyage of a worthy rival to those I have mentioned is that of Mr. Benjamin Morrell, a New Englander, in 1823. It is contained in a work in the library of the Royal Geographical Society, called 'Morrell's Four Voyages.' The first of these was to the Antarctic regions, of which he had had previous experience as mate of a whaler, and the whole narrative leaves an impression of truthfulness on me. Although it is, unfortunately, not as detailed as it might be—as his track is not laid down on the Admiralty chart, containing tracks of nearly all Antarctic explorers—I took the trouble to lay it down, and the results are curious and important.

He left Kerguelen's Land January 11, 1823,* and about the 21st. was in lat. $62^{\circ} 27'$ s., long. $94^{\circ} 11'$ E., or 80 miles north of the land at the western extreme of Wilkes's discoveries in the chart sent by him to Sir James Ross. Extensive ice-fields drove him north to lat. $58^{\circ} 42'$, "between which and the parallel of 60° s.," he says, "we continued to sail eastward till in 117° E. We then again changed our course and steered to the south until the 1st day of February. From the 11th of January, when we left Kerguelen Sound, till the 31st, we had but one day of clear weather, but we now took the wind fresh from the north-east, with an atmosphere clear and pleasant. By an observation at noon (February 1st), we were in $64^{\circ} 52'$ s., $118^{\circ} 27'$ E. The wind soon freshened to an 11-knot breeze, and we embraced this opportunity of making to the westward; being, however, convinced that the farther we went south beyond 64° the less ice was to be apprehended, we steered a little to the southward, until we crossed the Antarctic circle and were in lat. $69^{\circ} 11'$ s., long. $48^{\circ} 15'$ E. In this latitude there was no field-ice, and very few ice-islands in sight." It is very unfortunate so few astronomical positions are given; but those that are given I consider sufficient for all nautical purposes, and the longitudes are by chronometer.

This track passes to the southward of "Budd's high land," and also "Knox's high land," on Wilkes's chart; but although the clearness of the weather is remarked on, neither land nor barrier was seen. Wilkes's narrative is obscure in some portions, as "Totten's high land," for instance; but with regard to "Budd's Land," he says: "land was distinctly seen from 18 to 20 miles distant"—"a lofty mountain range." And with regard to "Knox's high land," he says: "I judged it was 7 or 8 miles distant; the day was remarkably clear, and the land very distinct."

* Morrell, chap. iv.

Well aware as I am of the very deceptive appearances of land in icy regions, where "seeing is not believing," I can hardly think Wilkes mistaken as to seeing land.

Morrell, at all events, proves Wilkes's Termination Land, and those previously mentioned, to be islands, and confirms Sir James Ross's surmise that the discoveries of Wilkes, Balleny, and D'Urville, form a chain of islands rather than an Antarctic continent.

Captain Davis* objected to the position for observing the transit of Venus in lat. 67° s., long. 105° E., as the high land would be between the observer and the sun. As it is more than probable this land is an island, a suitable southern position could easily be attained, and his objection vanishes; but the point should be settled prior to the period for the observation.

And now to return to Morrell. His track is then over a large extent of ocean no other navigator has traversed, between lat. 66° and 69° s., and from 105° E. longitude to the meridian of Greenwich, proving that Kemp and Enderby Land is either one or two islands of no great extent, his route being from 150 to 180 miles south of their position. He also disproves Wilkes's supposition† of a continuous Antarctic continent from "Ringold's Knoll to Enderby Land."

On the 23rd February he crossed the meridian of Greenwich in $69^{\circ} 42'$ s., very close to Bellinghausen's track in 1820. February 24th was in lat. $68^{\circ} 12'$ s., long. $4^{\circ} 17'$ w.; from thence he proceeded to the Sandwich group. Finding no seals there, he left March 6th, and steered to the south-west. On the 10th he was hemmed in with ice for twenty-four hours, "then escaped into an open sea clear of ice, in $64^{\circ} 21'$ s., $38^{\circ} 51'$ w."—being much more fortunate in this respect than Sir James Ross, who, eighteen years later, was stopped near the same position by an impenetrable pack. He then stood to the south till the 14th, when he attained lat. $70^{\circ} 14'$ s., long. 40° w. He here saw no field-ice, and only twelve bergs: found the temperature of the air was 47° and sea 44° . Weddel, not far from the same position a month earlier, found temperature of air from 34° to 40° , and the sea from 36° to 38° .

On the 15th March he was close in with New South Greenland, so named by Capt. Johnson, who commanded an American sealer, with whom Morrell had sailed the previous year; he kept two miles from it, with his boats away sealing for some hours at noon in lat. $67^{\circ} 52'$ s., long. $48^{\circ} 11'$ w. He says, "The coast trended about s.e.

* 'Proceedings Royal Geographical Society,' vol. xiii., No. 2.

† Wilkes's Abridgment, p. 148.

by s., and we thought we could discern some mountains of snow about 75 miles to the southward." He was then unfortunately obliged to steer north, although the sea was clear, being short of provisions and fuel. March 19th, he says, "We were close in with the south cape of New South Greenland in $62^{\circ} 41' s.$, $47^{\circ} 21' w.$, by dead reckoning, having had observations for three days. Coast trending s. and s. by w."

He then bears up for Staten Island, and the rest of his cruise offers nothing new. This discovery of Capt. Johnson is not down on any chart or atlas I have seen, and appears to me beyond a doubt, as Morrell coasted it for about 40 miles with his boats away sealing; he appears to imagine the land continuous to his South Cape in lat. $62^{\circ} 41' s.$, but he evidently experienced thick weather, as he had no observations for three days. The position of his Cape cannot, therefore, be very accurate; and as Sir James Ross afterwards crossed Morrell's track at right angles, it is certain the land is not continuous. I would therefore suggest that any geographer who may add this land to the chart should name it Morrell Land, in memory of a modest and enterprising explorer, whose exertions and hardships fully entitle him to the honour.

This book was published in 1832 at New York; it is therefore very curious that Wilkes should never have seen it, as he sailed in 1838 on his voyage. Neither does Ross appear to have known it, or he would have settled the position of Morrell's South Cape of New South Greenland, as he was about 60 miles from it on his last voyage.

It is generally considered that an Antarctic pack is much more dangerous than an Arctic, and it certainly is for sailing-vessels. In reading the narratives of Wilkes and Ross to gain information on the two positions assigned by the Astronomer Royal as most suitable for observing the transit of Venus in 1882, I was struck with the much greater advantage steam will give the future Antarctic explorer, both in gain of time and safety, than it has done to the Arctic voyager, owing to the different nature of the pack of the two regions.

In practical results little has been gained by the use of steam in the Arctic seas. Parry, in 1819-20, gained a greater westing at Melville Sound than Kellett in 1852 with a steam tender. Franklin, in Wellington Channel, did more than Belcher who had also a steam tender. In Smith's Sound, Kane, Hayes, and Davis, equalled Inglefield in the *Isabella*. Off Spitzbergen, Phipps and Buchan equalled the Swedish steamer of 1868; and Scoresby, senior, in 1806, surpassed it; as well as Lamont in his well-found screw steamer last year

(1869). Of the two searching-vessels that have been unable to get through Melville Bay, one was a sailing-vessel, the other a screw-steamer. I, of course, do not mean to say I would not rather have the steamer; but, with these facts before me, I do not consider steam has given more than 25 per cent. advantage to Arctic navigation over sails in point of time, and very little in point of safety. Neither do I allude to powerful steamers, but to those of the moderate horse-power necessary for an Arctic vessel to enable sufficient fuel and provisions to be carried. In the Antarctic Ocean I consider at least 100 per cent. will be gained in time and 50 per cent. or more in point of safety by the use of steam over sails.

This is owing to the different nature of the two packs. That of the Arctic consists of floes of ice varying from a quarter of a mile in circumference up to fields of ice whose extent cannot be seen from the mast-head; and, in the confined channels of the Arctic seas, these form obstacles impenetrable to either steamer or sailing-vessel, and distances are so small, comparatively, that when the season is favourable a sailing-vessel soon traverses them, as calms are rare and brief. Sir James Ross* says of the Antarctic pack:—"It consists of heavy floes which have been much broken up, and pressed and heaped together so as to form the most irregular shaped masses, and it seldom happened that we met with any piece more than a quarter of a mile in circumference, thus presenting a striking difference from that of the Arctic sea." "The cause of this is explained by the circumstances of the ice of the southern regions being so much more exposed to violent agitations of the ocean, whereas the northern sea is one of comparative tranquillity."

Wilkes† describes the pack "as consisting of pieces of ice from 6 feet to 500 or 600 feet in circumference."

Cook‡ says, of a pack he skirted for about 100 miles, "This, which I call field-ice from its extent, consists of many pieces of various sizes from 30 or 40 feet square to 3 or 4, close packed, and in places heaped one upon another." Again,§ next year—"The ice in most part lay close packed together, in other places there appeared partitions in the field and a clear sea beyond it." Sir James Ross is the only explorer who has penetrated an Antarctic pack, and Capt. Davis, in his paper, stated, not one of the novices in ice-navigation would have attempted it. They would have returned and swelled the number of "impenetrable packs." We now, reading by the light of Arctic experience, know steam would have easily penetrated with-

* Vol. ii., p. 150.

† Vol. ii., p. 293, note.

‡ 'Voyages.'

§ Ibid.

out encountering the daily danger of being squeezed between two heavy floes, as in the passage through Melville Bay.

Ross,* in his first cruise, met the pack January 1st, 1841; but thick weather, light winds, and a heavy swell, compelled him to keep off till the 5th, when he entered it; finding it, as he says, "by no means of so formidable a nature as we had been led to expect from the accounts we had received of the southern barrier in those parts, where the American and French expeditions encountered it." On the 9th they had passed through the pack and were in clear water. With steam he would have taken the pack on the 1st, and have passed through it in two days instead of four. Here we have a clear loss of six days in the first nine of January. Calms were frequent; the clear-weather winds were adverse; where a steamer would have made 100 miles daily, his sailing-vessels were beating 25 miles: this leewardly quality prevented his venturing into positions of danger, where a steamer would have run little or no risk. After the first week in February young ice, forming four inches thick in a couple of days, impeded their progress, adding greatly to the anxieties of navigation lest they should get beset in a calm. This would have been only a slight impediment to a steamer. In his second cruise, Ross† was forty-six days getting through the pack, which he estimated at 1000 miles in a W.S.W., E.N.E., direction. Had he been able to steer south it would probably not have been more than 200 miles in width. On his own course, steam would have gained twenty-five days, and perhaps more, as the winds were light and variable, and a heavy swell prevented towing with boats.

Had Ross possessed steam, I estimate he would have done in one season the work done by Wilkes in 1840, himself in 1841 and 1842. Wilkes would have done his work in half the time and more thoroughly, as he encountered more dangers from bergs than from pack. I draw the same conclusion from all the narratives I have read.

I trust I have sufficiently proved my opinion as to gain of time; and now for diminution of risk by steam. There are numerous instances in the narratives of Antarctic voyages of the vessels being becalmed in a heavy swell and drifting helplessly down on the pack, or a chain of bergs. One extract from Ross‡ will suffice to show the nature of these dangers.

March 7th, in a calm, he says:—"We found we were fast closing this chain of bergs, so closely packed together that we could distinguish no opening through which the ships could pass, the waves

* Vol. i., p. 177.

† Vol. ii.

‡ Vol. i., p. 281.

breaking violently against them, dashing huge masses of pack-ice against the precipitous faces of the bergs—now lifting them nearly to their summit, then forcing them again far beneath their water-line, and sometimes rending them into a multitude of brilliant fragments against their projecting points. Sublime and magnificent as such a scene must have appeared under different circumstances, to us it was awful, if not appalling. For eight hours we had been gradually drifting towards what to human eyes appeared inevitable destruction. The high waves and deep rolling of our ships rendered towing with boats impossible, and our situation the more painful and embarrassing from our inability to make any effort to avert the dreadful calamity that seemed to await us.

“We were now within half a mile of the range of bergs. The roar of the surf, which extended each way as far as we could see, and the crashing of the ice fell upon the ear with fearful distinctness, whilst the frequently-averted eye as immediately returned to contemplate the awful destruction that threatened in one short hour to close the world and all its hopes, joys, and sorrows upon us for ever. In this our deep distress ‘we called upon the Lord, and He heard our voice out of His temple, and our cry came before Him.’ A gentle air of wind filled our sails, ‘and we were saved.’”

With steam they would have enjoyed the “sublime and magnificent scene” in safety. In heavy gales, which are always accompanied by thick weather and snow-storms, a steamer could lie in safety under the lee of one of those immense icebergs, almost always to be met with, instead of drifting at the mercy of the wind and waves.

The great danger of an Antarctic pack is, that no matter how far involved in it, the swell caused by heavy gales is felt, and it is impossible to avoid collision with huge masses of ice, by which the safety of the *Erebus* and *Terror* was greatly endangered and their rudders destroyed. This would be the weak point of a screw-vessel with its double sternpost. The turbine principle would obviate that danger. If it is ever brought to a practical result, I agree with Captain Davis in advocating its use for ice-navigation. There are no heavy flocs in an Antarctic pack, and therefore no danger of being squeezed between two of them, as in Melville Bay, or driven 40 feet up the side of an iceberg, as happened to the *Intrepid* in 1851. I do not think, therefore, I am assuming too much when I consider steam will materially diminish the risk of the future Antarctic explorer. It also appears to me that the parallel of 60° s. has been crossed too late—very seldom by the middle of December, generally not before the first week of January. I see no reason why it

should not be crossed before the middle of November, which will give a great gain in time and increase of long days. November corresponds to our May, a month in which temperature offers no obstacle to Arctic navigation. Weddel on the 16th October arrived off the South Shetlands and found the land-ice, to his surprise, extending 95 miles from the shore, and up to the 16th November he was unable to get into the land. This, however, had not occurred to him on three previous occasions. He had unfortunately broken his thermometer; but, from his account, I should judge the temperature to have been between 32+ and 16+. To sum up, this increase of time and the use of steam trebles the future Antarctic exploring season, and the latter adds so very materially to safety and certainty, that I think the Astronomer Royal need not hesitate in selecting a position for observing the transit in 1874, should it be an even minor point of importance, and that the vicinity of his positions can be reached I consider as certain as reaching Spitzbergen annually; but our knowledge of the position of the land-ice is not sufficient to enable us to judge correctly as to the difficulties of landing; therefore, to make assurance doubly sure, I agree with Captain Davis in the propriety of a party wintering there—a most desirable plan in many respects, particularly for ascertaining the meteorology of the Antarctic regions.

The PRESIDENT, in returning thanks to the author of the paper, said he himself had no means of ascertaining the accuracy of Mr. Morrell's account of his remarkable voyage in the Antarctic Seas; but he would call upon some of the distinguished navigators, whom he saw in the room, to express their opinions on the subject. He would especially ask Staff-Commander Davis, who had been with Sir James Ross, in his memorable voyage, to state his views on the subject.

Staff-Commander J. E. DAVIS said that Morrell's book had not been overlooked, but had been too carefully *looked over*. He himself had mentioned the voyage last year, when he had the honour of reading a paper on Antarctic Discovery before the Society, and had then stated that the work was unworthy of credence. Admiral Sir Francis Beaufort, when constructing the South Polar Chart, in which he was greatly interested, had examined the work very carefully, but finally rejected it; later still, it had been studied with the view of assisting in the compilation of the Admiralty Ice Chart, but with the same result. No doubt the work was a very remarkable one, and also very amusing; and when first he had opened it accidentally in the middle, he was so struck with its resemblance to 'Robinson Crusoe' that he turned to see if the author told who his parents were, and found that he did. He (Captain Davis) would not say that the whole work was a fiction; indeed, in some parts it bore internal evidence to the contrary, and for the sake of argument he would admit it to be veritable northward of 50°, but to the southward of that parallel it was evident that Morrell was out of his latitude. There were only two ways by which such a voyage as that under discussion could be judged; first, by the experience of other navigators, and, secondly, by internal evidence of the work itself. He (Captain Davis) proposed to examine the voyage by

such lights as his own experience could suggest, and then by a few extracts from the work, placed in juxtaposition with passages from others. In the remarks he had to make, from his own experience, he would ask the Society to bear in mind that he did not speak from the experience gained in one voyage towards the South Pole, but three; he would also ask them to bear in mind that Morrell had only one vessel, and that did not exceed 150 tons' burden—that from the second day after leaving Kerguelen Land, not one day passed for 66 days without his meeting with broken ice, or snow, or hail, or all combined, and that during that time he could not keep a fire, yet the average run of the vessel was about 120 miles a day; taking the course in a straight line, and allowing for ins and outs and variations, the average must have been about 180 miles a day. He (Captain Davis) had often heard Sir James Ross's voyage called the most remarkable Polar voyage ever made, but if that of Morrell's were true, the palm must be yielded to that gentleman. He would not say that such a voyage was impossible, but he should incline to that word rather than "probable." When Morrell started from Kerguelen Land, he well knew that such a voyage, if accomplished, would be trumpeted all over the world as one of the most important that had ever been undertaken, and yet he neglected to give more than two or three positions; had he even appended a map to his work it would have been satisfactory. He passed close to land that had been seen by two voyagers, Wilkes and Balleny, without seeing it; his statement in respect to the temperature of the air and water becoming uniformly more mild as he advanced south of latitude 65° is so totally at variance with the experience of other navigators that one could hardly imagine how a man could have brass enough to put it on paper. An Arctic or Antarctic voyager must laugh at another statement in the book, viz., that whenever they came too near icebergs, and there was a danger of striking, they managed to "bear off" by a timely application of the sweeps. He also asserted that many vessels were lost by the vast waves and whirls occasioned by "rolling mountains" of overturning nicely-balanced icebergs; whereas he (Captain Davis) had never even seen more than three or four in all his experience. An account is given, in the book, of a curious bird, numbers of which were seen: it had a green head, breast variegated with all the colours of the rainbow, tail long and bushy, approaching yellow, resembling a bird-of-paradise; had Mr. Morrell restrained his tongue and pen, a great part of his narrative might have been believed.

The internal testimony of the book also afforded grounds for disbelieving the whole account of the voyage. He visited Auckland Islands, having made the voyage from Kerguelen Land in twenty-two days, or at the rate of about 180 miles a day; and gives a description of Carnley Harbour, with directions for entering, which, if any one attempted to adhere to, he would, most assuredly, lose his vessel: the bearings were wrong. He states the entrance to the harbour as 2 miles wide: it was only one. He said it was 15 miles to the head of the harbour: it was only 10. He described the east side of the island as having sandy beaches, behind which were luxuriant groves of trees, running 5 miles inland, with timber fit for ship-building, while the valleys and plains were clothed with boundless treasures of vegetation. Dr. Hooker, in describing the very same spot, said a low forest skirted the shore, with a dense thicket, while the trees were gnarled and stunted. Mr. Morrell said that birds were numerous and beautiful, hundreds of different kinds, all singing at once, and he described a species of cuckoo, parrots, and paroquets; while Dr. McCormick said there were not more than seven or eight kinds of land-birds on the island. Mr. Morrell said fish were abundant, and among them salmon and mackerel; while, on the other hand, Sir James Ross caught only two or three small fish there. Then again, Mr. Morrell says there were mussels from 12 to 15 inches long. He (Captain Davis) had seen very large mussels, but certainly none to

equal those. Mr. Morrell then wound up with what may be considered a "clincher," by characterising the island as "a delightful retreat for a few amiable families." Of the same spot, Sir James Ross said, "Well adapted for a penal settlement." Captain Hamilton had referred to Mr. Morrell's modesty, the following was a specimen of it from his book :—

"I regret extremely that circumstances would not permit me to proceed farther south, when I was in lat. $70^{\circ} 14'$ s., on Friday, 14th March, 1823, as I should then have been able, without the least doubt, to penetrate as far as the 85th degree of south latitude. But, situated as I then was, without fuel, and with not sufficient water to last twenty days, destitute of the various nautical and mathematical instruments requisite for such an enterprise, and without the aid of such scientific gentlemen as discovery-ships should always be supplied with; taking all these things into consideration, I felt myself compelled to abandon, for the present, the glorious attempt to make a bold advance directly to the South Pole. The way was open before me, clear and unobstructed; the temperature of the air and water mild, the weather pleasant, and the wind fair. Under such tempting auspices, it was with painful reluctance that I relinquished the idea, and deferred the attempt for a subsequent voyage. The anguish of my regret, however, was much alleviated by the hope that, on my return to the United States, an appeal to the Government of my country for countenance and assistance in this (if successful) magnificent enterprise would not be made in vain. To the only free nation on the earth should belong the glory of exploring a spot of the globe which is the 'ne plus ultra' of latitude, where all the degrees of longitude are merged into a single point, and where the sun appears to revolve in a horizontal circle. But this splendid hope has since been lost in the gloom of disappointment. The vassals of some petty despot may one day place this precious jewel of discovery in the diadem of their royal master. Would to heaven it might be set among the stars of our national banner!"

Taking the whole subject into consideration, he, Captain Davis, was morally convinced that the voyage was never made.

Mr. ENDERBY said, many years ago Mr. Morrell applied to him to be employed in his service, but he had heard so much of him that he did not think fit to enter into any engagement with him. He did not believe Mr. Morrell had made the voyage which he described in the book. If he did, it was most extraordinary that when he passed Enderby and Kemp Land he did not see the southern parts of those lands, which, *from his statement*, must have been *islands*, for not one word was said in his book about them. The work was full of extraordinary things, and Mr. Morrell appeared to be a kind of Baron Munchausen.

Mr. GALTON said, Captain Morrell pretended, at the time when his ship visited the west coast of Africa at about 23° s. latitude, to have made an excursion a considerable distance into the interior. He (Mr. Galton) had travelled through that country, and could say that, while Morrell's description was very graphic and truthful concerning the coast, he evidently knew nothing about that part of the interior. He described it as consisting of rich valleys, with large herds of cattle roaming over them, whereas it was a barren desert.

Captain SHERARD OSBORN said he could not help wondering that Mr. Morrell, finding the sea so clear and the temperature so warm, did not sail right across the pole, instead of making a circle round it. He quite agreed with the author of the paper in the necessity for exploring the Antarctic lands, as at present our information with regard to them was very imperfect. He thought justice had not been done to the advantages which steam afforded in penetrating the Arctic Seas. The fact was the discovery vessels he and McClintock had commanded were always tied to a big ship, which impeded their progress.

It was true that Kane beat Inglefield in the *Isabella*, but Kane followed the *Isabella*, which had cleared the way. So M'Clintock, in the *Fox*, passed safely beyond where Ross lost his ship and Parry lost his. He expressed his perfect confidence that when the Lords of the Admiralty had carried out proper measures of retrenchment, they would then be anxious to have an efficient body of officers and sailors; and he was firmly convinced that a better school in peace time could not be found for sailors than the Polar Seas, notwithstanding that a dilettante Admiral lately thought otherwise.

Admiral OMMANNEY said he was equally surprised with Captain Davis at the extraordinary speed with which Mr. Morrell had passed over such a great distance when the seas were encumbered with floating ice. With reference to the Antarctic Expedition destined for taking the observations of the transit of Venus, astronomers have decided that the most desirable spot for observing that phenomenon in 1882 is on the southern continent, in latitude exceeding 72° s., near to Mounts Erebus and Terror. But it would be very unwise to send out this expedition without some previous exploration of the Antarctic seas, in order to reconnoitre the position where the observing party can be placed, with the requisite arrangements and equipments for a service of such extremely hazardous character; otherwise that valuable opportunity for the solution of the greatest astronomical problem of the age might be lost for a century. As regards the sort of ship for exploring the Antarctic seas, no one would dream of going there now in such sailing-ships as Sir James Ross had to put up with when he made his important discoveries. With our improved knowledge of strengthening ships, and in the construction of marine engines which are now worked with so much less fuel, we could send forth ships perfect in all improvements of the day, and thus ensure a thorough survey of the southern continent preparatory for this great event. The *Erebus* and *Terror* had been described that evening as having drifted under an ice-barrier, where they seemed to be inextricably fixed, yet Sir James Ross brought those ships home, and managed to escape from many a similar predicament. In the Arctic seas, when he fixed the position of the magnetic Pole, he was given up for lost; four years had passed without any tidings of his party, but he managed to effect his retreat to Baffin's Bay and brought his party home. No tribute exists to commemorate the name and services of that distinguished officer of Arctic and Antarctic renown, Sir James Ross. He (Admiral Ommannney) begged to inform the meeting that a memorial was in progress, with a view to place his portrait in Greenwich Hospital alongside that of Captain James Cook, now in the Painted Hall, and he solicited their contributions in behalf of this object.

Captain HAMILTON said, whatever else Mr. Morrell might not have discovered, he was the first discoverer of guano in the island of Ichaboe and Lobos. The speed of 120 miles a day, with which he made the voyage, was nothing uncommon as the sea was not encumbered with ice. The objection about the size of the vessel was not very forcible, for Weddel made his voyage to the south accompanied by a cutter of only 64 tons, while Balleny was also accompanied by a cutter of the same size. A vessel of the size of the *Wasp* could easily sweep off an iceberg—Weddel did so. Mr. Morrell was a sealer, not an educated man, and therefore due allowance must be made for his errors. However, by-and-by, one proof of the accuracy or otherwise of his descriptions would be afforded by any one coming across New South Greenland. Every ice-navigator knew that the season varied very much in the Polar regions; and Weddel, at his highest latitude, found the temperature of the water 34° or 36° , and the air 42° . Then, too, Weddel had found the sea open, as well as Morrell, while Sir James Ross was invariably almost beset in a close pack, and the difference of temperature between a pack and open water is considerable. It was by no means strange that he did not see

Enderby or Kemp Land, because he passed 130 or 180 miles to the south of them. Biscoe, who discovered them, was not able to approach within 30 miles of them, and therefore he did not give a very accurate account. One great reason why steam alone could not be used to any great extent in the Arctic regions was, that steamers could not carry provisions enough, as they would have to take such a large supply of coals. In the Arctic regions a pack was never in the same place two seasons running, and most probably it was the same in the Antarctic regions, for Balleny passed the preceding year over 30 or 40 miles of water where Wilkes and D'Urville found a perpendicular barrier of ice. With regard to crossing 60° s. in November in the year 1823, Scoresby reached the parallel of 81° n. in April: in 1813, 80° n. was reached in the beginning of the same month; in Davis's Straits, M'Clintock was able to get under weigh on the 18th of April, and in 1857 lat. 74° n. was reached May 21st in Davis's Straits. These facts showed that, as far as temperature was concerned, there was no difficulty in navigating the Arctic regions early in the year; and he did not see why the same rule should not apply to the southern pole.

2. *On Greenland Fiords and Glaciers.* By J. W. TAYLER.

IN the 'Proceedings' issued July, 1869, which I received in October last, I see, in a Paper by Mr. R. Brown, that he has arrived at the conclusion that glaciers have "hollowed out" the fiords of the North: by hollowing, I take it for granted he means causing fiords to be where none were before—glacier the cause, fiord the effect. This extraordinary conclusion seems to have passed unquestioned, except by Mr. Whympser.

I have spent the greater part of the last 18 years in that home of glaciers, Greenland, exploring the fiords, but have never seen anything to lead to such a conclusion. I maintain that the reverse is the case—that instead of glaciers excavating fiords, they are continually filling them up. It is true that boulders and *débris*, borne along by the ice, scratch, polish, and grind the rocks to a considerable extent; but, though strong as a transporting agent, ice alone has but little excavating power: it is like the soft wheel of the lapidary—the hard matter it carries with it does the polishing. I hope to show that the power of ice in excavating has been much overrated.

I have described fiords in Greenland in a former Paper. Fiords in general are familiar things to many. I will merely remind my readers that those of Greenland are walled in by rocks averaging 1000 feet in height: their length varies from 10 to 100 miles; breadth 1 to 8 miles; depth of water from a few feet to 200 or more fathoms. The rocks on each side of these fiords are marked by ice-action at intervals, but more so near the glacier.

The deep fiords have, for the most part, glaciers launching icebergs; the shallow ones have not. Some of the largest glaciers are really